

Jones (Mary A. Dixon)

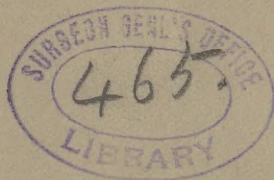
A Hitherto Undescribed Disease of the Ovary; Endothelioma changing to Angeioma and Hæmatoma.

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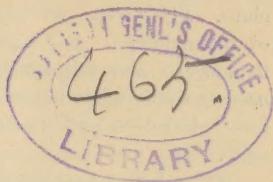
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BROOKLYN.

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A HITHERTO UNDESCRIBED
DISEASE OF THE OVARY;

ENDOTHELIOMA CHANGING TO ANGEIOMA AND HÆMATOMA.

BY MARY A. DIXON JONES, M.D.,

BROOKLYN.

So far as I know, this peculiar formation, or degenerative disease, of the ovary has not been described. The name kirsoma has been proposed on account of the peculiar convolutions that are manifested. The first one or two microscopical specimens showing this change I considered as curiosities, or as the initial stage of a growth which would possibly, upon further development, be alveolar sarcoma.

I have studied the subject, first by carefully considering the individual characteristics of each case, the symptoms, etc., and afterward the pathological condition of the specimen. Probably now it will be best to present the subject in that order: 1. Individual cases. 2. The microscopical appearances of the disease.

The patient in whom I first recognized this formation was operated on in my private hospital on May 25, 1885. She was thirty-five years of age, single. Her trouble commenced with a severe aching pain in the left side of the pelvis, which gradually increased year by year, extending to the other side of the pelvis, and frequently the pain was so sharp and lancinating

that she screamed with agony. She consulted many physicians. Fly-blisters were repeatedly applied to the lower part of the abdomen. For nine months she was treated for "inflammation and misplacement of the uterus"; pessaries were used and only made her worse. Subsequently she was treated for "ulceration and uterine congestions," with no better results.

When I first saw the patient she was pale, emaciated, anæmic, and had very much the appearance of one who has phthisis. Examination showed the uterus to be acutely anteflexed; ovaries tender and intensely sensitive. The patient was nervous, hysterical, and her mental conditions were much disturbed. Her friends said she was "not exactly right in her mind." I was fully convinced that the ovaries were in some way exceedingly diseased, and that all her abnormal nerve symptoms were due to reflex irritation from these diseased organs. I so informed the patient, and told her that an operation for their removal might be necessary. Still, I commenced with a course of treatment, hoping, if possible, to save her from the necessity of an operation; but she showed no improvement, and I became convinced I was only wasting time. So, on the 25th of May, I performed the operation. She made an excellent recovery, and since, her health has been good and she has been able to work. It would have been better if the diseased structures had been removed ten years before; every day they remained they were doing injury to the general system and interfering with her general health. A few months after the operation she took entire charge of her paralyzed mother through a long sickness. She stood it well, and ever since has been able to attend to her usual duties. I saw the patient on June 28, 1889. She seemed to be in good health and strength, and was doing the work for an ordinary-sized family.

This case was one of a series reported in the "Medical Record," August, 1886. A microscopical examination was there given, and a drawing of the formation. I studied the subject in Dr. C. Heitzman's laboratory, and he said: "This

tumor we shall have to term either an endothelioma or an alveolar sarcoma."

The next person in whom I found this growth or degeneration was a patient in the Woman's Hospital of Brooklyn. She first came with her mother to see me, March 30, 1887, a pale, emaciated, cadaverous-looking woman, apparently with tubercular consumption. She had been married some years, and had never had any children. She suffered with constant pain on both sides of the pelvis, increased by walking, and at times the pains were especially sharp and severe. The patient said she had had for years tenderness and soreness in the lower part of the abdomen; did not menstruate till she was sixteen, and then it was accompanied with great suffering. Examination showed that the ovaries were prolapsed, enlarged, and so sensitive that the patient shrunk from the slightest touch, and it was evident they were the seat of some form of disease which was in some way seriously deranging her general health. She had been treated by many excellent physicians, both locally and constitutionally, and they had done everything possible for her; still, I commenced a course of constitutional and local treatment, but with no better results, and finally decided there was but one way to relieve or cure the patient, and that was by removing the hopelessly diseased organs. This operation I performed in the Woman's Hospital of Brooklyn on May 10, 1887; it was completed in about fifteen minutes, and the patient recovered without a bad symptom.

Sections of the ovary showed this growth in great perfection and in a very advanced stage of development (Fig. 1). It seemed to occupy the whole ovary, extending quite to the periphery, and replacing all the special ovarian tissue. In one ovary there were some cysts the walls of which were formed by stratified layers of inflammatory tissue,* and

* In the microscopical study of the ovaries I have frequently found these small cysts, and never have seen one but it was surrounded by newly formed layers of inflammatory tissue, showing long-existing dis-

this growth seemed to be extending or infiltrating itself into the already diseased tissue. In other instances the cyst

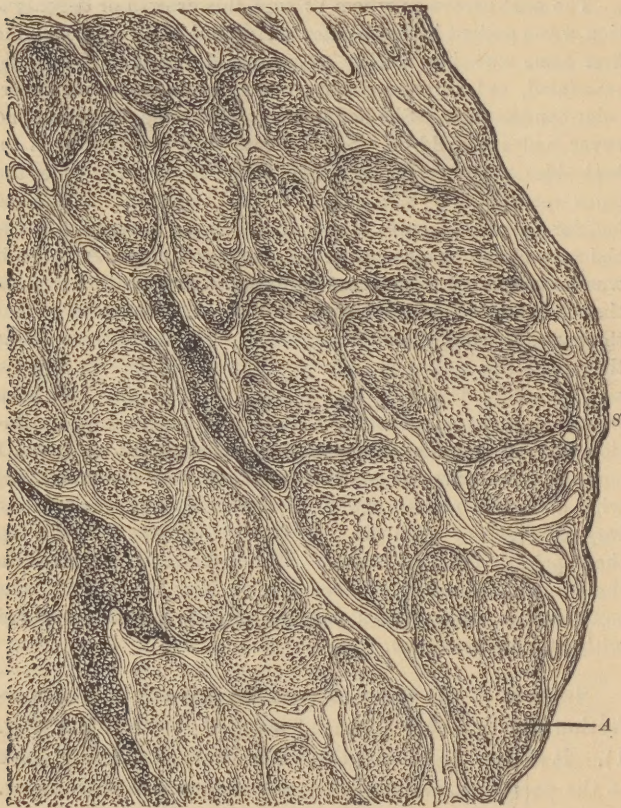


FIG. 1.—Endothelioma of the left ovary, extending to the periphery. $\times 25$. *S*, surface of the ovary; *A*, alveoli filled with endothelia.

ease; frequently layers of secondary fibrous connective tissue, the results of the inflammation, again in a state of acute inflammation. These small cysts have a history of suffering; they are either the outcome of inflammation or have produced the inflammation.

wall is composed entirely of this growth, which seems so curiously to destroy all healthy or diseased tissue of the ovary, gradually occupying the whole structure.

Another remarkable feature of this case, and one which I have since recognized in many others—indeed in every instance of this disease—was an abnormal condition of the ova. There was not a normal ovum to be found. Many of them were broken up into inflammatory corpuscles. No epithelia, no maculæ, no yolk; in some the wall was changed into fibrous connective tissue; in some the follicles were enormously swollen and contained a hydropic yolk; others contained granular matter and hæmatoblasts, while in other places there was a complete atrophy of the ova, thus exhibiting a destruction of the most vital part of the ovary.

This fact opened a most interesting field for investigation, and presented a new cause for sterility. The patient had come to me not only to be relieved of her suffering, but, with a sorrowful heart, she wanted to know why she did not have children. Her cry was that of Hannah's: she had that deep-seated longing which is in every true woman's heart, which we all so fervently respect and admire, and which, if not gratified, makes life a disappointment. But the condition of this patient showed, as I have seen in many cases, that *the disease which had caused the suffering had also produced a confirmed sterility.*

This patient had long complained of tenderness and soreness in the pelvis, and that the marital relations were not only painful but repulsive and unendurable. After the operation her emphatic statement to me, as well as similar statements of many other patients, disprove the assertion that the removal of the ovaries destroys sexual desires. So far from it, this patient assured me to the contrary, and similar statements have been made to me by other patients.

In May, 1887, I presented to the New York Pathologi-

cal Society a microscopical section of this growth. At my request Professor Prudden took a small section of the ovary of this patient, and had it prepared and mounted in his laboratory. He wrote me it was carcinoma, also sending one of the sections so labeled. I sent a microscopical section of the ovary of the same patient to Waldeyer, of Berlin; he replied, October 18, 1887, that it was *carcinoma*.

But, from studies and drawings I had made during the summer, I could clearly see that the protoplasmic bodies seemed to round themselves, the coarse granules wonderfully shaping themselves into blood-corpuscles. In some places the elongated protoplasmic bodies seemed to fuse together, forming canals in which were the shadows of blood-corpuscles, and then would appear the completely formed blood-vessel, and near by many cross-sections of blood-vessels completely filled with blood-corpuscles. These changes I traced over and over again, and saw them in other specimens; so it was clearly proved to my mind that *this growth was a new formation of blood-vessels and blood-corpuscles*. This statement was presented to the New York Pathological Society, December 12, 1888.

From further study I thought the growth essentially started from some mysterious change in the menstrual follicle, as represented in Fig. 2; the living matter shoots up like the lines of light of an aurora borealis; soon are found the granules and hæmatoblasts, and then commences the rapid growth, spreading and increasing. Other figures show a more advanced stage; the myxomatous portion is composed of nucleated tracts of protoplasm. But why this growth should have the power of destroying every structure of the ovary, even firm secondary fibrous connective tissue, or why an ovary should so degenerate, or what is its pathological significance, are still questions for consideration. Certain it is that this formation is as surely accompanied

with manifestations of ill-health as is the breaking down of lung tissue, and the symptoms of both diseases are in many respects similar. It destroys normal structure as effectually



FIG. 2.—Myxomatous tissue of a menstrual follicle. $\times 500$. *F*, fibrous portion of the follicle; *M*, myxomatous portion filling the follicle. The protoplasmic bodies filled with hæmatoblasts.

as does tubercle. When we look at this rapidly growing formation and the great masses of granules, the impression forces itself upon us that it *may* be malignant. Future investigation may prove it so. The cancer epithelia do not multiply more rapidly, or destroy the tissues more surely, or seem more threatening or monstrous in their appearance and growth.

If it were so that we could watch and study this growth from day to day, see its progressive changes and its general effects upon the system, we might tell the final result. Who knows how disastrous it is, or how fatal, or how many deaths it may have caused? Certainly it destroys the health,

comfort, and usefulness of the individual, and as surely its removal has restored health, comfort, and happiness, as well as ability to work. If it were as possible to remove tuberculous lungs as this growth, or as we would a gangrenous toe, or as successfully as we do diseased ovaries, how many could thereby be given relief and years of restored health!

Though this growth is apparently so fearful in its appearance, so destructive to healthy structures, yet from it develops only an army of little blood-corpuscles and forming blood-vessels. But may not this, apparently so innocent a formation, have a serious pathological significance? Why should these autochthonous collections of blood be here, while there is pallor on the face, a tallowy hue to the skin, and an emaciation of the whole body?

This disease seems in some way to destroy such important formations as the ova. Yet in the early stages, before the disease has so much extended, in some instances women with this growth have borne children. A healthy ovum even in the midst of a sea of disease may develop and fulfill its final destination.

The clinical features in this disease are so marked that in many instances I have diagnosticated it on the first examination, and this diagnosis was subsequently verified by microscopical examination of the diseased structure. All the patients complain of a special and characteristic pain in the region of the ovaries, at times severe, sharp, and lancinating; there is a peculiar pale or cachectic look, or the cadaveric pallor of the consumptive; they all have a marked emaciation. Some, who are naturally strong with a tendency to *embonpoint*, from the time of the development of the disease begin to emaciate; in some instances lose twenty, thirty, or forty pounds. The further advanced the disease, the more emaciated and the more extreme the pallor. The more the ovary is occupied or filled with this growth, the

more serious the manifestations in the system. So pronounced are these symptoms, and especially in connection with the characteristic manifestations that usually accompany diseased ovaries, that a diagnosis can usually and with confidence be made. I have so verified it in many instances. Not long since I had two patients. Both had all the symptoms mentioned—pain, pallor, some loss of flesh, etc.; in both I diagnosticated this disease, and subsequent history of the cases proved it to be correct. A young woman came to me last spring. She had always been in good health. No suffering in any way till the previous five or six years, when, as she remarked, she had at times such pain and distress that she rolled on the floor in agony, and was so faint and weak that she could keep up only two or three days successively. She had been under the care of good physicians, and had been in two hospitals. In one an operation was proposed; in the other she was pronounced incurable. I felt confident she had endothelioma of the ovary, and an operation would relieve her sufferings. She was anxious for the operation, and, as it was evident her condition was growing worse, it was right that she should be relieved. The operation was performed in the Woman's Hospital of Brooklyn. She made an excellent recovery. Fig. 3 is a representation of the ovary. The same form of degeneration spreads elsewhere in both ovaries. The patient had chronic oophoritis, and much of the normal structure of the ovaries was changed in consequence; the arteries were seriously affected with endarteritis obliterans, and some were waxy. The ova were diseased. In the tubes many of the epithelia were destroyed or changed to muco-pus, and there was an inflammatory infiltration of the mucosa.

A few weeks ago a patient came to my office who had been married fifteen years and had no children. At the age of sixteen she was well and rugged; when twenty years of

age she began to have pain in the pelvis, to lose flesh, and looked as if she were going into decline; now, at the age of thirty-five, she is worn out with suffering, and I feel confident she has endothelioma of the ovary which is surely



FIG. 3.—Left ovary with an endothelioma loosely imbedded in the cortex. The ovary is halved; so is the nodule on the right upper periphery. On the lower half is seen the cavity previously occupied by the nodule. $\times 2$.

and prematurely destroying her life. On August 9th a lady called to see me complaining of similar pains in the pelvis; had the same pallor, not so much emaciation, though she says she has lost thirty pounds in flesh; has been married ten years, and had no children. Without doubt she has the same trouble of the ovary, which has produced the pain and destroyed the ova. By carefully considering all the symptoms the disease can be diagnosticated in every instance.

The third patient in whom I found this peculiar growth was a Mrs. B., thirty years of age; came to me in March, 1887; the same story of suffering, distress, cramps, and extreme pain; not able to be around. Examination showed both ovaries enlarged, prolapsed, and extremely sensitive. Every motion of her body gave her distress, and she was entirely unable to attend to her household duties. Operation May 20th of the same year, in the Woman's Hospital of Brooklyn. Right ovary very much enlarged, pear-shaped, one end measuring two inches in diameter; the left ovary was less enlarged. The patient made an excellent recovery, and has now the physical vigor to carry on a large business, besides attending to her household duties.

Microscopical examination showed that both ovaries were entirely filled with this growth in an advanced stage of formation. The growth also formed the walls of some large cysts, and the ova, as far as examined, were diseased.

The fourth case of this form of degeneration was Miss C., single, twenty-eight years old, sent to me by Dr. B., of Bridgeport, Conn. The patient had been sick for more than a dozen years; had much suffering at her menstrual periods; had so broken down in constitution, and her general health was so enfeebled, that she was no longer able to attend to her ordinary duties. Dr. B. writes "that everything possible had been done, and now evidently an operation was demanded." The patient was pale and emaciated. Her friends supposed she had consumption and that she was going into a decline. Examination showed that her lungs were sound and as strong as any part of her body, but that the ovaries were enlarged, dislocated, and exceedingly painful to the touch. She was admitted into the Woman's Hospital of Brooklyn. Further treatment gave her no relief, so an operation was deemed advisable, and, after consultation, was performed. The patient made an excellent recovery, and has since gained in health, strength, and flesh. She was able soon to resume her ordinary avocations, and she wrote me some months after: "It seems so strange to be free from pain"; said she "could not thank me sufficiently for all that was done; that before the operation she was the most miserable creature in the world; since, she was the happiest." She wrote June 14,

1889: "I am now in perfect health after fifteen years of suffering."

In this case also the entire ovary was filled with this remarkable and peculiar growth, except some little patches on the border, which were in a state of intense inflammation. No ova could be found. Near the periphery were some cysts, the walls of which were formed of this growth. This growth could be seen gradually invading and replacing every tissue. Some fields under the microscope looked like a sea of blood; near by were large blood-vessels clearly defined, with a well-marked endothelial lining and filled with blood-corpuscles.

CASE V.—Mrs. A., twenty-eight years old, married some years, no children, has pain in the pelvis all the time; ovaries and tubes extremely sensitive; marital relations so painful she can not endure them. She has suffered so much that she was anxious to have the operation. The ovaries were small, cirrhused, not much larger than a bean, and covered with fine adhesions. All the ovarian structure was completely destroyed by the growth. The tubes were larger than the ovaries, and in a state of interstitial salpingitis. The patient seemed to do well.

CASE VI.—Mrs. H., forty-three years old. For some years her sufferings had been unusually severe, low down in the pelvis on both sides. At times the pain was agonizing; said she had not been able to perform any kind of labor. On September 9, 1887, I removed the diseased uterine appendages; they were in a mass of adhesions. The left tube was the size of a lemon; it, with the ovary, was firmly bound to the posterior part of the uterus. On the right the appendages were wedged down deep into the pelvic cavity. The ovary proved to have been transformed into a dermoid cyst. The tube was enlarged, firmly adherent, closed at the outer extremity, and all traces of the fimbriæ gone. The patient made an excellent recovery, and while there were serious complications in this case, probably this growth in the ovaries caused most of the patient's suffering.

CASE VII was also complicated by a diseased condition of the Fallopian tubes. The patient was twenty years old, had suffered for some time with diseased ovaries, married three years and a half, two children; last parturition followed by some septic

troubles. She came to me suffering with severe pain in the pelvis, unable to walk or to attend to her household duties. Examination showed deep transverse laceration of the cervix; perinæum gone; also there was serious disease of the uterine appendages; but, as she had so lately borne children, I decided to do nothing more than repair the cervix and the perinæum. She was admitted into the Woman's Hospital of Brooklyn, treated for some six weeks, injuries repaired successfully, and the patient sent home. After her return home she still complained of such constant distress and so much suffering that she begged to re-enter the hospital, and was admitted. The uterine appendages were in such an extremely diseased condition that there was no relief for her except by their removal, which I did in August, 1887. On both sides the appendages were buried in a mass of adhesions. Each of the ovaries formed part of the wall of an abscess cavity; each tube was completely closed at the fimbriated extremity, and in a state of intense interstitial salpingitis. There were numerous miliary abscesses in the walls of each of the tubes.

The patient made an excellent recovery, and is now in the enjoyment of perfect health. Microscopical examination of the ovaries showed that almost the entire structure was replaced by this growth. The ova were ruined. Her irreparable sterility had already been produced by the condition of the tubes.

CASE VIII.—Mrs. G., thirty-five years old, feeble and emaciated, complaining of constant pain in the pelvis. Her pulse and temperature varied little from 100. Her friends thought she was going into consumption. Examination showed the uterus retroflexed at the internal os, ovaries enlarged, tender, and low down in Douglas's *cul-de-sac*. All efforts were made by constitutional and local treatment to improve her general health and strength and relieve her suffering, but the distress in the pelvis continued, and an operation seemed to be her only hope. She was not only anxious for the operation, but disappointed at any delay. I performed laparotomy on May 2, 1887. The whole broad ligament was like wet paper; it melted under the ligature, bled profusely, tore off even to the corner of the uterus, but all was



FIG. 4.—An endothelioma of the ovary approaching the surface. $\times 250$.

properly secured, and the patient did well. She has since been a woman of remarkable strength and vigor, without indications of decline or consumption, has done the work for a family of eight persons, and looks remarkably well.

All the normal structure of the ovary was destroyed by this growth. The ova were in a retrograde condition, many of them filled with granular matter, the nuclei breaking up into medullary corpuscles.

CASE IX.—Mrs. R., a pale, feeble, emaciated woman of twenty-three years, married five years, two children, youngest three years of age, has constant pain in the lower part of the pelvis, especially severe during the menstrual period and five days before; evacuation of the bowels produces great pain; coition also extremely painful; uterus retroverted and retroflexed; ovaries prolapsed; pessaries had been used without any good results, only increasing her distress. She entered the Woman's Hospital of Brooklyn, and I performed laparotomy on October 24, 1887. The growth in the ovaries is represented by Fig. 4. In one ovary two large cysts were found, surrounded by layers of inflammatory tissue. The ova were diseased.

CASE X.—Mrs. M., also a delicate, emaciated woman, with apparent consumptive tendencies and such constant distress in the pelvis that life was a burden. She was not able to care for her family, neither could she submit to the marital relations. I performed laparotomy for her in April, 1887. She made a good recovery. Both ovaries were small and in a state of cirrhosis, and occupied by this growth; tubes in a state of slight interstitial salpingitis.

CASE XI.—Miss W., thirty-nine years of age, single, pale, feeble, and emaciated. She commenced to be sick when she was twenty-five years of age, and has continued to grow in worse conditions, the pain increasing in severity. Much of her time not able to be out of bed. She was for a while in the Massachusetts General Hospital, also under an eminent specialist of Boston. He informed her that her ovaries were diseased, but that an operation would be exceedingly dangerous on account of her debilitated condition. She was in the Woman's Hospital of Brooklyn during the summer of 1888, returned in the fall, and

in November of that year I removed the diseased tubes and ovaries. She made an excellent recovery, and has told me since "she was so much better, and so glad that she had had the operation." She spoke of once being "rosy and fleshy," and how her sickness had made her "thin and pale," but that "since the operation she was regaining her flesh and rosy complexion." She also said that "before she went into the Woman's Hospital she had suffered so much she did not expect to live, but that now she was gaining health and strength."

The ovaries of this patient showed a most remarkable and well-advanced condition of this growth. The whole ovarian structure seemed to be replaced by it.

CASE XII.—Mrs. T., forty years of age, consulted me in August, 1888; was in feeble health, pale, and emaciated; suffered constant distress in the pelvis; ovaries extremely sensitive; uterus pulled to the right by shortening of the right broad ligament. Nine years previously she had consulted an eminent specialist of Philadelphia, who told her she had inflammation of the ovaries. Since then her sufferings had continued to increase and her condition to grow worse till her nervous system was broken down and in an extremely irritable condition. So cachectic was she in appearance that some imagined she had malignant disease. She informed me that she wanted to be relieved, even if it were necessary to perform an operation. She asked me that the ovaries might be removed. This operation I performed in October, 1888, and immediately she began to gain in health and strength, and in a few weeks showed very much improved conditions.

The right ovary was somewhat enlarged, and most of it occupied by a fibroid growth. Microscopical examination showed a number of nodular fibromata, also enlarged blood-vessels, many of them in a state of endarteritis obliterans.

The left ovary was cirrhotic, changed to cicatricial tissue, the outcome of chronic oophoritis. In some portions of the same ovary I discovered globular deposit of lime salts, and within them angular protoplasmic bodies, like bone

corpuscles—osteoid tissue. The Falloppian tubes showed chronic inflammation and were atrophied. But the most remarkable feature was this growth, invading and taking possession of both ovaries. The ova were diseased.*

Microscopical Representations of the Growth.—Fig. 4 represents the general appearance of the ovary in an advanced stage of development. Right ovary, $\times 25$. P, peritoneal layer. C, cortical layer, with numerous bundles of smooth muscles. V, fibrous connective tissue, in which the ovary has been transformed, freely supplied with capillary and venous blood-vessels. E, endothelioma of a markedly convoluted form, the depressions between which are filled outwardly with freely vascularized connective tissue, and inwardly by non-vascularized. F, coagulated fibrin. S, dense fibrous connective tissue, likewise exhibiting faint convolutions, and holding protoplasm in a reticular arrangement with pigment granules.

Here we see a narrow zone of the cortical substance of the ovary left, not exceeding in diameter one to two millimetres. The greater portion of the cortex is replaced by a convoluted tissue visible to the naked eye, being characterized by the presence of coarsely granular corpuscles arranged in a radiating direction and interrupted in many places by light gaps, which, on close examination, prove to be forming blood-vessels. A peculiarity of this formation is that it is bordered by a fibrous connective tissue on all sides. The difference, however, is that the connective tissue entering the depressions between the convolutions toward the surface of the ovary is richly supplied with blood-vessels, mostly capillary and venous in nature, while the connective tissue in the depressions looking toward the hilus lacks blood-vessels either entirely, or shows only a

* Microscopical specimens from these ovaries were presented to the New York Pathological Society, December 12, 1888.

limited number, not exceeding the amount usually found in the cortical substance of the ovary. In many instances the spaces between the convolutions looking toward the hilus are filled with coagulated fibrin, and frequently coagulated fibrin fills all the space left between the convolutions and the hilus.

In another case, perhaps still more advanced, there is but little ovarian tissue left at the cortex, and the rest of the ovary is taken by a partly convoluted and partly irregular tissue, holding in its central portion numerous and large cavities, apparently filled with blood and fibrin. The growth seems to replace by degrees all the original structures of the ovary, transforming them into its own, and yet, in many instances, apparently not increasing the size of the ovary. In the most advanced stage of the disease, or in the highest degree of change, there may be no visible augmentation of the volume of the diseased ovary. Sometimes it is really diminished in size.

Toward the outer periphery of the convoluted tissue we not infrequently meet with patches of an extremely dense fibrous connective tissue, the bundles of which are separated by branching protoplasmic masses, often supplied with dark-brown pigment granules.

Solid masses of either hyaline or slightly fibrous structure are often met with in ovaries, and are usually considered as the remnants of menstrual follicles. Hyaline masses especially are considered to be remnants of the structureless or basement membrane of a bursted follicle, and are probably the product of a plastic or formative inflammation ensuing after the rupture of a menstrual follicle. Not infrequently such a dense convoluted wall surrounds a markedly myxomatous structure, as is represented in Fig. 5, a menstrual follicle at the boundary between cortex and medulla of an ovary affected with endothelioma in a high degree, $\times 100$.

A, fibrous connective tissue, such as we see in the medulla of the ovary, with numerous convoluted arteries of varying



FIG. 5.—A myxomatous menstrual body. $\times 100$.

sizes. V, vein. C, convoluted wall of a probable menstrual follicle surrounding a myxomatous structure. N, transition between a dense fibrous and a less dense myxomatous tissue.

Low powers of the microscope suffice to show that the convoluted wall of such a follicle is not uniformly dense

throughout, but often exhibits transitional features from a dense fibrous to a less dense myxomatous tissue. The wall under these circumstances still shows an irregular protoplasmic reticulum, when the meshes are filled with fibrous basis substance. This tissue blends with ordinary myxomatous tissue in which the meshes are filled with a hyaline or slightly granular basis substance. These features are more clearly represented by high powers of the microscope, as in Fig. 6, a menstrual follicle at the boundary between cortex and medulla, $\times 600$. F, dense fibrous connective tissue composed of coarse bundles between which are few nuclei left. B, transitional tissue between fibrous and myxomatous, made up of protoplasmic tracts with nuclei at the points of intersection, and holding in the meshes a less dense basis substance. M, myxomatous portion composed of nucleated tracts of protoplasm, the meshes being filled with a mucoid basis substance, in which delicate offshoots of the protoplasmic tracts produce a delicate reticulum. The center of the mesh usually holds a nucleus-like body, apparently suspended in the mucoid basis substance.

Here we observe changes in the morphology of the basis substance from a purely fibrous to a purely myxomatous tissue. As an additional feature in the myxomatous portion we often observe light- or dark-brown pigment granules imbedded in the protoplasmic tracts, which is another proof of these bodies being remnants of menstrual follicles.

I have described these formations because some of my specimens tend to prove that the follicular wall is the tissue in which occur the morbid changes under consideration. I have seen the transitional portion between fibrous and myxomatous basis substance becoming transformed into polyhedral medullary corpuscles, known by the term endothelia. By this term histologists designate corpuscles of the connective-tissue series, meaning a growth of the me-

dullary corpuscles to such an extent that they flatten one another, and thus assume similarity with epithelia. In developing bone such bodies have long since been known by



FIG. 6.—A myxomatous menstrual body. $\times 600$.

the term osteoblasts—that is, bodies ready to be transformed into basis substance. Whenever bone tissue becomes inflamed, the reappearance of the osteoblasts is one

of the first symptoms of osteitis. Judging from analogy, the tissue of the follicular wall may likewise return into its medullary or embryonal condition, and cause the reappearance of medullary corpuscles in the shape of endothelia. The convoluted figure of the follicular wall may explain the convolutions of endothelioma.

There may be another source, however, of the convoluted dense formations in the ovary, more especially at the boundary zone between the cortex and medulla, or in the medulla itself. This process is endarteritis obliterans. I simply allude to this by no means rare occurrence, which I propose to study up at some future time. We find convoluted masses of considerable length, and can trace their origin from previous arteries, which, as is well known, have a markedly tortuous course in the medulla of the ovary. See Fig. 7, a solid convoluted mass of fibrous tissue—the early stage of endothelioma.

In specimens of endothelioma I have often seen obliterated arteries, especially at the boundary zone between cortex and medulla, and in the medulla. The final result is not only a transformation of a pervious artery into a solid tract, apparently structureless, or made up of dense fibrous connective tissue, but sometimes broad convolutions arise from hyperplasia of the adventitial coat leading to the new formation of convoluted granular masses, in the centers of which remnants of the arteries are recognizable by a few muscular fibers left unchanged. No trace of caliber is recognizable in such a remnant of an artery. This process may be another source of endothelioma, although I have not yet seen positive proof of a transition of such remnants into endothelial formations. On the other hand, endothelioma is often traversed by arteries exhibiting a marked condition of endarteritis.

The next question to be considered is, What are these

coarsely granular corpuscles building up the formation under consideration? The nature of these bodies can best be seen in places where they are yet scanty and scattered in the fibrous connective tissue, as we often find in the vicinity

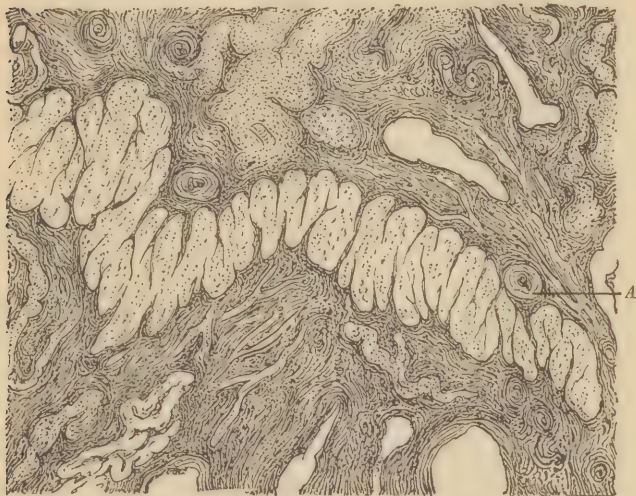


FIG. 7.—Convoluted fibrous tissue, the result of endarteritis obliterans. $\times 100$.
A, a transverse section of a permeable, unchanged artery.

of well-developed endothelioma. Here we observe bodies of varying sizes between the bundles of fibrous connective tissue, distinctly flattening one another, whether they are present in groups or rows. See Fig. 8, hæmatoblasts changing to capillary blood-vessels, from a specimen of endothelioma in the initial stage of formation. F, dense fibrous connective tissue, with a reticulum of protoplasm between the bundles, the bundles themselves partly transformed to lymph corpuscles. E, isolated and grouped endothelia. E', a bundle of fibrous connective tissue transformed into

coarsely granular masses. C, capillary blood-vessels springing or developing from a row of coarsely granular bodies.



FIG. 8.—Hæmatoblasts changing to capillary blood-vessels. $\times 600$.

Bodies of this description are known since 1839, when Theodore Schwann described them as blood cells and, in his wonderfully acute power of observation, claimed that from them arose both the blood-corpuscles and the walls

of the blood-vessels. Whenever an active new formation of blood and blood-vessels is going on, we invariably meet with such bodies. This is the case, for instance, whenever one tissue changes into another, when cartilage breaks up into medullary tissue preceding the formation of bone tissue, also at the border of the external epithelium of the enamel organ of the developing tooth, together with the active proliferation of the external epithelium thereof, and its transformation into medullary tissue. In 1872, pp. 100 and 341 of his "Microscopical Morphology," C. Heitzman described the same corpuscles as hæmatoblasts, claiming that every granule may eventually become a red blood-corpuscle, while the peripheral portions of the corpuscles, by fusion of hæmatoblastic substance, produce the walls of the blood-vessels. Since 1867 we have known, through the studies of S. Stricker, that the capillaries originally are solid cords, which by vacuolation become hollowed out. Hayem (1877) discovered corpuscles in the blood smaller than red blood-corpuscles, and likewise termed them hæmatoblasts. Still later Ehrlich described coarsely granular bodies which were termed by him "Mastzellen," which means well-fed cells, which also proved to be either fat- or blood-forming elements.

In studying the coarsely granular corpuscles under consideration, we find a large number of homogeneous glistening granules and lumps within them, or scattered without being in the interior of sharply defined corpuscles, of a bright-yellow color, not taking up the stain of ammoniacal carmine. The close study of these granules shows their gradual change into red blood-corpuscles—a change easily traceable in almost any part of the specimen. There is no doubt we have before us hæmatoblasts in large numbers, either arranged in sharply circumscribed bodies or scattered in the fibrous connective tissue, from which in time red blood-

corpuscles do originate. At the same time the peripheral portions of such coarsely granular bodies serve for the building up of the walls of blood-vessels, first of all of capillaries. Such newly formed capillaries have peculiarly fluted contours, reminding one of their origin from previous rows of coarsely granular bodies, and invariably contain a certain amount of red blood-corpuscles, or so called ghosts, apparently even before entering any communication with the vascular system. Not infrequently we see sprouts arising from the walls of such capillaries, either solid or filled with hæmatoblasts, or hollowed out, and being in connection with the main vessels by means of a comparatively narrow neck.

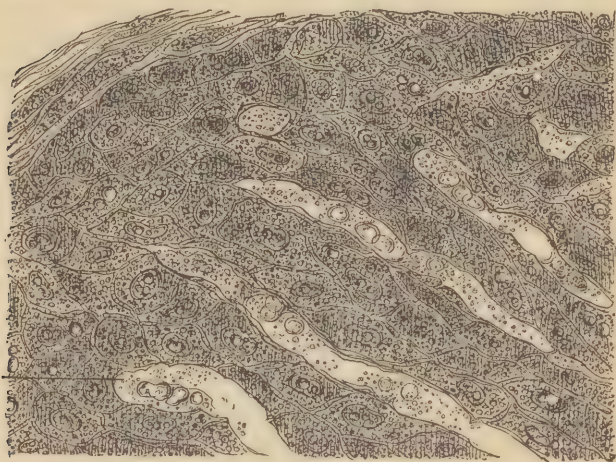


FIG. 9.—An endothelioma in full development, showing the change of endothelia into capillary blood-vessels. $\times 600$.

That the bodies filled with hæmatoblasts mainly serve for the new formation of blood-corpuscles and blood-vessels is easily demonstrated on any marked formation of

endothelioma with high powers of the microscope. See Fig. 9, Ridger.

F, fibrous connective tissue at the border, showing the initial stage of formation of hæmatoblasts. E, endothelia more or less filled with hæmatoblasts. V, blood-vessels traversing the growth mainly in a radiating direction.

We observe radiating rows of polyhedral bodies which either contain a well-marked central nucleus, or, instead of this, one or several glistening lumps of a high refractive power. Between the bodies we can trace light narrow rims, usually traversed by delicate offshots, obviously serving for an interconnection of the polyhedral bodies.

Ever since Bizzozero, of Turin, Italy, drew attention to the occurrence of endothelial growths strictly of a connective-tissue nature, the attention of the pathologist was drawn to tumors, holding a varying amount of such bodies, for which the name of endothelioma has been suggested. Further research has, however, revealed the fact that a tumor deserving the name of endothelioma does not exist. Endothelia, if grouped together in large masses, are either a prestage for the formation of a lipoma or an angioma.

In some instances I have been able to trace a large number of newly formed arteries at the periphery of an endothelioma, near the surface, where arteries, especially large arteries, do not occur in a normal ovary. The formation of arteries is represented in Fig. 10, an endothelioma with new formation of arteries, veins, and capillaries.

E, endothelia of comparatively small size filled with hæmatoblasts. L, lymph corpuscles in clusters. A, artery in transverse section. A¹, artery in longitudinal section. V, sinuous veins holding hæmatoblasts and red blood-corpuscles.

The development of veins goes on the same plan as that of capillaries, the only difference being the large caliber

and sinuous or bay-like cavities along their course. The wall of such veins is made up of endothelia seen in edge view, or the wall appears to be continuous or homogeneous.



FIG. 10.—Endothelioma with a marked new formation of blood vessels. $\times 300$.

The arteries develop on the same plan with the addition of smooth muscle fibers around the wall. Whenever arteries are newly formed, we invariably find in their neighborhood

clusters of lymph-corpuscles — viz. : medullary corpuscles more or less homogeneous, lacking nuclei, and not transformed into medullary corpuscles filled with hæmatoblasts. So far as I could trace the formation of arteries, I am convinced that the muscle fibers arise from the previous lymph-corpuscles in a manner described by Dr. Jeanette B. Green in her studies on the decidua.

Hæmatoma of the ovary is considered usually as an extravasation of blood into an ovarian cyst, in many instances giving very little disturbance to the system.

Endothelioma, on the contrary, leads to and terminates in a collection of blood by a change of tissue or a new formation, and seems to be of profound pathological importance, as it not only destroys the anatomical structure of the organ and consequently its physiological functions, but disturbs seriously, and in some instances destroys the health and comfort of the individual.



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